

XLIV.—*On some new Genera and Species of Parasitic and Fossorial Hymenoptera from the Khasia Hills, Assam.*
By P. CAMERON.

[Concluded from p. 185.]

HERESIARCHINI.

NÆNARIA, gen. nov.

Mandibles toothless, becoming gradually narrowed. Labrum large. Antennæ dilated beyond the middle. Scutellum flat, not margined. Median segment areolated; the areola open at the base, about three times longer than broad; spiracles linear. Abdomen with seven segments, narrow, long; its apical segment bluntly rounded, large, not narrowed below; the sheath of the ovipositor projecting, pilose; the ventral keel extends to the end of the third segment. Areolet 5-angled, narrowed above. Clypeus broad, its apex transverse. Occiput rounded inwardly, not distinctly margined.

The abdomen is longer and narrower than usual, and is of almost equal width to the penultimate segment; it has a cylindrical appearance; the pygidium is semicircularly depressed between the cerci. Head larger than usual, as wide as the mesothorax. The apex of the hind femora reaches to the middle of the third abdominal segment. The middle abdominal segments project at the apices below.

A genus easily known by the large head, unidentate mandibles, and long, narrow, cylindrical abdomen.

Nænaria grandiceps, sp. n.

Black; the face, clypeus, labrum, inner orbits narrowly, the outer narrowly above, the base of the mandibles, a line on the pronotum, two short lines on the mesonotum, the scutellar keels, the scutellum broadly laterally, postscutellum, a square mark enclosing the spiracles on the metanotum, a larger mark on the apex extending on to the spiracular area, base of pronotum, the lower half of the propleuræ at the base, the lower half of the mesopleuræ in the middle, a line, gradually narrowed below, on the metapleuræ under the wings, and two irregular marks on the apex of the sternum, pale yellow. The four apical segments of the abdomen have a bluish hue, the apex of the petiole broadly, two large conical marks on the apex of the second segment, a large triangular one on the side of the third, a much smaller one rounded and

narrowed at the base, a narrow line on the apex of the fourth and fifth, a broader one on the sixth, and a still broader one on the seventh, yellow. The four front legs pallid yellow, the tibiæ and tarsi lined with black, the middle and hinder femora black, and the hinder coxæ yellow at the apex above and below. Wings hyaline, with a fulvous tint, especially at the base; the areolet is much narrowed above; the stigma fuscous. ♀.

Length 20 mm.

Hab. Khasia Hills. Coll. Rothney.

Joints 8-16 of antennæ white. Face and clypeus closely punctured, the former covered with short, the latter with longer white hair. Thorax closely punctured. Scutellum slightly convex, its sides with a perpendicular slope. The basal half of the areola is transversely shagreened, the apical deeply furrowed laterally; the posterior median area stoutly, irregularly, transversely reticulated. The petiole is stoutly keeled down the sides, its middle irregularly punctured, the postpetiole closely punctured; the second and third segments longitudinally striated in the middle at the base. Gastrocæli smooth, deep, punctured on the outer side above.

Chiaglas varipes, sp. n.

Black; the inner orbits narrowly, the outer broadly on the lower half, the face, except for a bell-shaped black mark in the centre, which follows the shape of the clypeus, the palpi, a line on the pronotum, a similar line on the lower edge of the propleuræ, the tegulæ, tubercles, a large mark (rounded below) on the lower half of the mesopleuræ, two short lines on the mesonotum, the scutellums, two large marks, extending on to the pleuræ, on the apex of the median segment, the apex of the postpetiole, two large marks on the apex of the second segment, two smaller narrower ones on the apex of the third, the apices of the fourth, fifth, and sixth, and the whole of the seventh, the ventral fold and the apices of the ventral segments, pale yellow. Legs rufous; the anterior and the base of the tibiæ paler, more yellowish in tint; the four anterior coxæ and trochanters and the basal joint of the hinder trochanters yellow, the hinder tarsi and the apices of the anterior blackish. Wings hyaline, the stigma fuscous, the nervures darker. Antennæ with a broad white band in the middle, the top of the band marked with black. ♀.

Length 13 mm.

Hab. Khasia Hills. Coll. Rothney.

Head thickly covered with white pubescence below the antennæ; the face and, to a less extent, the clypeus punctured; the front closely, finely, transversely striated in the middle, its sides sparsely punctured. The median segment is more closely and strongly punctured than the mesopleuræ, the areola is irregularly reticulated, most strongly on the apex; the apical slope is irregularly striated, the striae running into reticulations on the sides. Postpetiole obscurely, finely, longitudinally striated in the middle; the second and third segments are closely and distinctly punctured in the middle; the gastrocœli are stoutly striated at the base.

This is a smaller species than the type of the genus (*C. nigripes*, Ann. & Mag. Nat. Hist., Feb. 1902, p. 152), and may be easily separated from it by the rufous legs.

Algathia * *albitarsis*, sp. n.

Black; the face, clypeus, a band on the middle of the upper inner orbits (narrowed obliquely on the lower half), an oval mark on the lower edge of the outer orbits, the edge of the pronotum behind, the scutellum, except at the base, the postscutellum, two large marks on the sides of the apex of the median segment, covering the spines above, the base of the pronotum, a small mark on the apex of the propleuræ behind, and the tubercles, white; the apex of the first abdominal segment, the base of the second, its apex more broadly, and the apex of the third segment, yellow, tinged with fulvous; the apical two segments clear pale yellow. The four front coxæ and trochanters are white, the rest of the legs fulvous, except the apices of the tarsi, which are black; the hinder legs rufous, their coxæ black, broadly white above and dull rufous at the base below; the trochanters on the outer side, the apex of the femora, of the tibiæ, and the basal joint of the tarsi, black; the rest of the tarsi white. Wings hyaline, the stigma and nervures black. Antennæ black, the scape beneath and a band in the middle white. ♂.

Length 10–11 mm.

Hab. Assam.

Algathia khasiana, sp. n.

Black; the face, clypeus, mandibles, the inner eye-orbits to the lower ocellus, a mark, longer than broad, behind the posterior, the outer orbits on the lower two thirds (narrow above, broad below), the malar space, the tegulæ, a narrow line on the pronotum, a broader one on the lower edge of

* *Algathia*, Cam. Zeits. f. Hym. u. Dipt. 1902, p. 392.

the propleuræ, the tubercles, the lower third of the mesopleuræ, the scutellum, postscutellum, the outer areæ on the apex of the metanotum, the yellow extending on to the metapleuræ on the lower edge, lemon-yellow. Legs rufous; the four front coxæ and trochanters pale yellow; the hinder coxæ black, marked with obscure rufous on the inner side; the apex of the hinder femora black; the hinder tarsi white, the basal joint black. Wings hyaline, the nervures and stigma black. The antennæ longer than the body; black, the scape yellowish; the flagellum with a broad white ring. ♂.

Length 7 mm.

Hab. Khasia Hills. Coll. Rothney.

Head closely punctured, the clypeus almost smooth; there is a short wide furrow below the ocelli. Thorax closely punctured; the base of the metanotum and the areola smooth; the rest of the metanotum and the spiracular area closely transversely punctured. Abdomen black; the apex of the first segment yellow; the apex of the second broadly rufous, and with a narrow yellowish line on the end; the apex of the third is narrowly rufous, and there is a large rufous mark on the apical half of the segment on the sides; the last segment is white, as is the case with all the species of this genus. The second and third segments are closely punctured; the second in the centre is closely, irregularly, and finely reticulated. The areola is wider than long, and is broadly rounded backwards at the base and apex.

Myermo * *fumipennis*, sp. n.

Black, shining; the sides of the face broadly to the base of the mandibles, the sides of the clypeus broadly, the mark extending upwards to the outer side and above the foveæ, the malar space, the upper inner orbits (more broadly above than below), a line on the upper edge of the pronotum, a narrower one on the lower edge of the propleuræ, the tegulæ, tubercles, a large, oblique mark (narrowed and rounded at the apex) below the middle of the mesopleuræ, the scutellum, postscutellum, a large mark (obliquely narrowed behind) on the sides of the median segment and enclosing the spiracles, the apical half of the postpetiole, and a mark more or less narrowed inwardly on the sides of the abdominal segments, pale yellow. Wings fuscous violaceous, iridescent, the stigma and nervures black. Legs black, the greater part of the

* *Myermo*, Cam. Ann. & Mag. Nat. Hist. ser. 7, vii. p. 523.

four anterior femora and the four anterior tibiae in front pallid yellow. ♂.

Length 17–18 mm.

Hab. Khasia Hills. Coll. Rothney.

Antennae serrate towards the apex, the eleventh to seventeenth joints white below. Face and clypeus closely punctured; the apex of the clypeus more sparsely. Mesonotum closely and distinctly punctured. Median segment more coarsely punctured than the rest; the areola is more or less coarsely reticulated and stoutly, irregularly, longitudinally striated; the posterior median area is coarsely, irregularly, transversely striated; the outer areae are coarsely reticulated. Pleurae strongly and closely punctured. Postpetiole smooth; its base in the middle closely longitudinally striated. The marks on the abdominal segments are larger and more narrowed on the inner side on the second and third; the marks on the last segment are small and longer than broad.

Myermo maculitarsis, sp. n.

Length 15–16 mm. ♀ ♂.

Hab. Khasia Hills. Coll. Rothney.

This species is identical in the coloration of the body with *M. fumipennis*, but the legs are more widely marked with yellow, and, more particularly, there is a broad white band near the base of the tibiae; otherwise the two may be known by the form of the areola: in *fumipennis* its apex is roundly bent inwardly; in the present species it is transverse, and it is finely and closely punctured throughout, and is without any striations; the posterior median area is closely rugosely punctured, not stoutly transversely striated.

There may be two small marks on the mesonotum; all the tibiae have a broad white band near the base; the basal joint of all the tarsi is broadly white, and the other joints may be marked with white; the wings are clearer, more hyaline than in *fumipennis*, the stigma is testaceous; the gastrocoeli are not so strongly punctured, and the striae are fewer, weaker, and more curved. The white ring on the antennae wide. Face and clypeus rather strongly punctured; the front and vertex alutaceous, opaque; the clypeus edged with black. Mandibles white at the base, the middle rufous, the apex black. Palpi white. Thorax alutaceous. Scutellum sparsely and not very distinctly punctured; the median segment is more strongly punctured than the mesonotum, especially on the sides; the areola is broader than long

and is bluntly rounded behind. Pleuræ alutaceous, except under the hind wings, where there is a smooth spot of plumbeous hue.

PNEUSTICI.

FEDALMA, gen. nov.

Areolet irregular in shape, triangularly produced below; the apical nervure faint; stigma elongate. Apical tooth of mandibles elongate. Metathoracic areæ undefined; the areola twice longer than broad, its apical keel indistinct; the spiracles small, round. Abdomen twice the length of the thorax; the petiole long, narrow, the apex slightly dilated, curved; the small round spiracles are placed near the apex, behind the middle of postpetiole. Gastrocœli shallow. Ovipositor short, hardly projecting.

This genus cannot well be confounded with any of the genera with circular metathoracic spiracles. The apex of the clypeus is rounded; its sides at the top are widely and deeply depressed; the eyes are margined on the inner side; the wings are short, reaching only to the apex of the third abdominal segment; the transverse basal nervure is interstitial; the base of the second abdominal segment is depressed; the apical nervures in the hind wings are indistinct, almost obsolete.

The long tricoloured abdomen and the short wings give this insect a rather noteworthy appearance.

Fedalma tricolor, sp. n.

Black; the petiole and basal half of the second abdominal segment bright red; the third and the apices of the apical three segments are yellow; the front legs testaceous, their coxæ and trochanters pale yellow, as are also the middle trochanters and coxæ; the hinder coxæ rufous; the rest of the hinder legs broken off. Wings clear hyaline, the stigma and nervures testaceous. ♀.

Length 9 mm.

Hab. Khasia Hills. Coll. Rothney.

Antennæ long, black, the basal two joints and a broad band on the middle yellowish white. Face, front, and vertex closely and distinctly punctured, the clypeus smooth, almost impunctate; the lower part of the front with stout, straight, transverse striæ, separated in the middle by a longitudinal one. Thorax closely punctured, the metathorax thickly covered with short white hair; it is elongate, and its apex has an

oblique slope; from the middle of the areola a transverse keel runs to join a longitudinal one placed inside the spiracles. There is a short shallow furrow on the sides of the mesosternum at the base; the sternal furrow is wide at the apex. Petiole smooth and shining; the red base of the second abdominal segment is closely, distinctly, and longitudinally striated; the black part is strongly aciculated.

Fossores.

Ampulex montana, sp. n.

Length 16 mm. ♀.

Hab. Khasia Hills. Coll. Rothney.

This species agrees closely with *A. trigona*, Cam., in size and coloration, and in having the head obliquely narrowed behind the eyes, but may be known from it as follows:—

The upper third of the mesopleuræ coarsely deeply punctured; the sides of the median segment closely, distinctly, transversely striated; the vertex not distinctly furrowed in the middle behind.....	<i>montana</i> .
The upper third of the mesopleuræ not distinctly punctured; the sides of the median segment not closely, regularly, transversely striated; the vertex distinctly and deeply furrowed in the middle behind	<i>trigona</i> , Cam.

Antennæ entirely black: the third joint nearly as long as the following two united. Head green with bluish tints; the sides and apex of the clypeus and its central keel black. There is an oblique irregular row of punctures on the sides of the vertex; the antennal tubercles are large, and their keels extend halfway up the front; between them is an elongated tubercle. The clypeus has a row of punctures near the apex; its middle at the apex is bluntly rounded, with a shallow rounded incision on either side. The head is distinctly obliquely narrowed behind the eyes. Pronotum large; the apical part somewhat longer than the width at the base; smooth, the base depressed in the middle and with a distinct longitudinal furrow on the basal half. Mesonotum smooth in the middle; the sides with some large scattered punctures. Behind the scutellum is a row of stout longitudinal keels, which are weaker in the middle than on the sides. Median segment completely transversely striated; the striae on the outer edge stouter than on the rest of the segment; the apex is smooth; the three central keels reach to this smooth part; the apical slope is transversely striated in the centre; the sides and top are irregularly striated-reticulated. The upper part of the mesopleuræ from above

and is bluntly rounded behind. Pleuræ alutaceous, except under the hind wings, where there is a smooth spot of plumbeous hue.

PNEUSTICI.

FEDALMA, gen. nov.

Areolet irregular in shape, triangularly produced below; the apical nervure faint; stigma elongate. Apical tooth of mandibles elongate. Metathoracic areæ undefined; the areola twice longer than broad, its apical keel indistinct; the spiracles small, round. Abdomen twice the length of the thorax; the petiole long, narrow, the apex slightly dilated, curved; the small round spiracles are placed near the apex, behind the middle of postpetiole. Gastrocœli shallow. Ovipositor short, hardly projecting.

This genus cannot well be confounded with any of the genera with circular metathoracic spiracles. The apex of the clypeus is rounded; its sides at the top are widely and deeply depressed; the eyes are margined on the inner side; the wings are short, reaching only to the apex of the third abdominal segment; the transverse basal nervure is interstitial; the base of the second abdominal segment is depressed; the apical nervures in the hind wings are indistinct, almost obsolete.

The long tricoloured abdomen and the short wings give this insect a rather noteworthy appearance.

Fedalma tricolor, sp. n.

Black; the petiole and basal half of the second abdominal segment bright red; the third and the apices of the apical three segments are yellow; the front legs testaceous, their coxæ and trochanters pale yellow, as are also the middle trochanters and coxæ; the hinder coxæ rufous; the rest of the hinder legs broken off. Wings clear hyaline, the stigma and nervures testaceous. ♀.

Length 9 mm.

Hab. Khasia Hills. Coll. Rothney.

Antennæ long, black, the basal two joints and a broad band on the middle yellowish white. Face, front, and vertex closely and distinctly punctured, the clypeus smooth, almost impunctate; the lower part of the front with stout, straight, transverse striæ, separated in the middle by a longitudinal one. Thorax closely punctured, the metathorax thickly covered with short white hair; it is elongate, and its apex has an

oblique slope; from the middle of the areola a transverse keel runs to join a longitudinal one placed inside the spiracles. There is a short shallow furrow on the sides of the mesosternum at the base; the sternal furrow is wide at the apex. Petiole smooth and shining; the red base of the second abdominal segment is closely, distinctly, and longitudinally striated; the black part is strongly aciculated.

Fossores.

Ampulex montana, sp. n.

Length 16 mm. ♀.

Hab. Khasia Hills. Coll. Rothney.

This species agrees closely with *A. trigona*, Cam., in size and coloration, and in having the head obliquely narrowed behind the eyes, but may be known from it as follows:—

The upper third of the mesopleuræ coarsely deeply punctured; the sides of the median segment closely, distinctly, transversely striated; the vertex not distinctly furrowed in the middle behind.....	<i>montana</i> .
The upper third of the mesopleuræ not distinctly punctured; the sides of the median segment not closely, regularly, transversely striated; the vertex distinctly and deeply furrowed in the middle behind	<i>trigona</i> , Cam.

Antennæ entirely black; the third joint nearly as long as the following two united. Head green with bluish tints; the sides and apex of the clypeus and its central keel black. There is an oblique irregular row of punctures on the sides of the vertex; the antennal tubercles are large, and their keels extend halfway up the front; between them is an elongated tubercle. The clypeus has a row of punctures near the apex; its middle at the apex is bluntly rounded, with a shallow rounded incision on either side. The head is distinctly obliquely narrowed behind the eyes. Pronotum large; the apical part somewhat longer than the width at the base; smooth, the base depressed in the middle and with a distinct longitudinal furrow on the basal half. Mesonotum smooth in the middle; the sides with some large scattered punctures. Behind the scutellum is a row of stout longitudinal keels, which are weaker in the middle than on the sides. Median segment completely transversely striated; the striæ on the outer edge stouter than on the rest of the segment; the apex is smooth; the three central keels reach to this smooth part; the apical slope is transversely striated in the centre; the sides and top are irregularly striated-reticulated. The upper part of the mesopleuræ from above

central furrow at the apex are some broad furrows. The sternal process is widely divergent; the lobes longish, narrowed and widely hollowed in the middle. The coxæ, trochanters, the fore femora, and the tibiæ behind are green; the apex of the fore femora and the tibiæ are rufous in front; the tibial and tarsal spines are rufous; the tarsal joints become gradually wider towards the apex, the pad reaches to the middle of the joint; the inner tooth of the claw is shorter and thicker than the outer. Wings smoky fuscous, clearer towards the apex; the nervures and stigma fuscous, testaceous towards the apex; there are only two transverse cubital nervures; the apical nervure on the radial cellule is broadly rounded and is united to the second transverse cubital; the appendicular cellule is open at the apex; the first recurrent nervure is received in the middle, the second in front of the middle of the cellule. Abdomen blue at the base, dark green in the centre, darker towards the apex; the second segment is wider at the base than at the apex, its length is not quite double the width at the apex.

A distinct species. Characteristic is the row of squarish arcæ bordering the apex of the median segment and the interstitial second transverse cubital nervure.

Ampulex pilosa, Cam.*

This species appears to be the commonest form in Assam. The females vary from 15–25 mm. in length; the males also vary greatly in length, some being as small as 11 mm. The males are densely pilose like the females, and have the labrum and the greater part of the mandibles testaceous. Most of the males have the median segment and the abdomen for the greater part purple. The basal two segments are punctured all over, but not very closely; the apical segments are more closely rugosely punctured. The head is rather strongly punctured and, as usual, is obliquely narrowed behind the eyes.

The wings in both sexes vary in tint, ranging from light to dark smoky; the nervures may be black or fuscous; and the first transverse cubital nervure may be complete, indicated at the top and bottom only, or completely obliterated. A few examples show distinct brassy tints on the head and thorax. In the larger males there is a more or less well-defined longitudinal furrow in the middle of the head. The pleuræ and breast in the males are thickly covered with

* Ann. & Mag. Nat. Hist. ser. 7, vol. v. p. 37.

soft white pubescence. The species in both sexes is much more thickly pubescent than any of the other Indian species; and the antennæ are also longer than usual.

Discolia erythropoda, sp. n.

Black; the front, vertex, a line on the upper outer eye-orbits, the sides of the metanotum, two small marks on the first and the greater part of the second and third abdominal segments above, lemon-yellow; the legs dark red and covered with reddish hair; the hair on the head, thorax, base of abdomen, and its ventral surface reddish; on the rest of the abdomen the hair is black: the wings fulvo-hyaline, darker and deeper in tint along the costa; in the centre, near the apex, is a longish fuscous cloud; the stigma and nervures dark fulvous. ♀.

Length 24–26 mm.

Hab. Khasia. Coll. Rothney.

Front and vertex shining, impunctate; the centre of the face is raised, surrounded by a smooth shining line, which is broadly rounded above. Mesonotum smooth and shining, rather strongly irregularly punctured round the edges. Scutellum sparsely punctured. Metanotum punctured somewhat closely, but not strongly, except on the centre at the base. The second dorsal segment of the abdomen is narrowly bordered with black at the base, more broadly at the apex; on the sides, united to the last by a narrow neck, is an irregular black mark; the third segment at the base and apex is irregularly lined with black, and the basal band projects in the centre, the projection becoming gradually narrowed towards the apex; the apical three segments are thickly covered with long black hair. ♀.

The male has the clypeus, except for a triangular black mark in the middle, the eye-incision, a large broad mark on the pronotum, two large marks on the base of the second abdominal segment, and the greater part of the third, lemon-yellow. The legs are coloured as in the female; the coxæ and trochanters are black; the antennæ are entirely black; the median segment wants the large lateral yellow marks found in the female; the apical streak seen in the female wings is absent, and the fulvous tint is almost absent, except along the fore margin, in the wings; the hair on the thorax is pale. The tegulæ in both sexes are rufous; the scape may be rufous in the female; and the ventral surface is entirely black. The base of the petiole has a straight

oblique slope. In fresh examples probably the whole of the mesonotum would be covered with reddish pubescence.

Belongs to the group of *Discolia histrionica*, F.

Tiphia Rothneyi, sp. n.

Black; the wings fuscous violaceous; the pro- and mesopleuræ smooth, impunctate; the postscutellum smooth, distinctly furrowed down the centre; the central keel on the median segment indistinct on the apical half of the segment. ♀.

Length 16-17 mm.

Hab. Khasia. *Coll.* Rothney.

Head above the antennæ coarsely punctured, shining; the clypeus closely punctured, its apex smooth and with a rounded incision. Pronotum coarsely punctured; the apex and the basal slope smooth. Mesonotum in the middle coarsely punctured; the scutellum with a row of large punctures round the sides and apex, and with a few punctures in the middle. Postscutellum smooth and deeply furrowed down the middle. Median segment opaque, shagreened; there are three keels, the middle keel interrupted beyond the middle; the apex depressed and striated behind the keel. Pro- and mesopleuræ smooth, shining, and almost glabrous; the basal half of the metapleuræ smooth, the apical closely punctured. Abdomen shining; there is a row of punctures on the apex of the first, and an interrupted one on the base of the second segment, which is depressed; the third, fourth, and fifth segments are minutely punctured, except in the middle; the apices of the dorsal segment and the greater part of the pygidium bear long fuscous pubescence; the ventral segments fringed with long white hair.

Characteristic of this species are the smooth impunctate pro- and mesopleuræ and the smooth deeply furrowed postscutellum. It comes close to *T. fumipennis*, Sm., from Borneo, which may be known from it by the mandibles being entirely ferruginous, by the pro- and mesopleuræ being distinctly punctured and thickly covered with longish white pubescence, and by the postscutellum not being furrowed. In *T. fumipennis* the median segment is opaque; the surface is strongly and closely aciculated, more strongly at the base than at the apex; the central keel does not reach to the apex of the basal part of the metanotum, on either side of it is an irregular, waved, longitudinal keel; on the apical third some stout irregularly curved keels which almost form reticulations; there is a distinct keel above the antennæ;

the apex of the clypeus is smooth and has a round incision; the scutellum is punctured round the edges, but the apex itself is smooth; the postscutellum is sparsely and more finely punctured at the apex; the basal half of the pygidium is closely and strongly punctured, and thickly covered with long black hair. The hinder wings are lighter coloured than the anterior.

T. fumipennis of Bingham (Fauna of Brit. India, Hym. p. 58) is clearly a different species from Smith's, and probably represents a new species.

Ceropalidæ (olim *Pompilidæ*).

The name *Pompilus* has been found by Mr. Wm. J. Fox (Ent. News, xii. 1901, p. 268)—see also Mr. Wm. H. Ashmead, Canad. Ent., April 1902, p. 79—to be preoccupied, and its use therefore must cease in the Hymenoptera. Mr. Ashmead has revised the classification of the family. He has divided it into six subfamilies. His subfamily Aporinæ he divides into two tribes, the Anopliini and the Aporini. The former he divides into thirty-one genera, and it is practically equal to the genus *Pompilus* of Bingham's 'Fauna of Brit. India,' Hymen. If Mr. Ashmead's views are to be adopted, the Indian species must be split up into a large number of genera. If only one genus is to be used, as in Bingham's work, then the name *Anoplius*, Lep., must be adopted. Not having had time to examine the European and Asiatic species with the aid of Mr. Ashmead's papers, I use here the name *Anoplius* in the sense in which Bingham employs *Pompilus*. The latter name has been in use since 1798. Its disappearance and displacement by *Anoplius* will certainly cause some confusion for a time.

Anoplius omærus, sp. n.

Black, shining, bare; the wings fuscous hyaline, the stigma and nervures black, the third cubital cellule appendiculated. ♀.

Length 10 mm.

Hab. Khasia. Coll. Rothney.

Antennæ black, bare. Head shining, bare, except for a few long black hairs on the vertex. Eyes distinctly converging above; the hinder ocelli are separated from each other by the same distance as they are from the eyes; there is a narrow longitudinal furrow on the lower half of the front. Apex of clypeus transverse. Mandibles black, piceous

near the apex. Palpi black. Thorax almost bare, impunctate, only slightly shining. Median segment with a broadly rounded slope from the base to the apex. Legs black; the tibial and tarsal spines black. Wings uniformly fuscous hyaline; the stigma and nervures black; the first transverse cubital nervure is obliquely bent above the middle, the larger lower part is more curved; the second is straight and oblique, the pedicle is not one fourth of its length; the third is roundly broadly curved; the first recurrent nervure is received shortly beyond, the second almost in the middle of the cellule; the accessory nervure in the hind wings is interstitial. Head not much developed behind the eyes; the occiput transverse.

This species cannot well be confounded with any of the described species with petiolated third cubital cellule. The second and third cubital cellules at the bottom are almost equal in length; the apical abdominal segments are sparsely covered with long black hairs. There are indications of silvery pubescence on the body.

Anoplius icades, sp. n.

Black; the basal two segments of the abdomen rufo-testaceous; the four anterior coxæ beneath, the clypeus, and the lower inner orbits pale yellowish white; the wings hyaline, their apical third smoky, the nervures and stigma black. ♂.

Length 8 mm.

Hab. Assam.

Antennæ stout; the joints not dilated beneath, those of the flagellum fuscous beneath. Head black, covered with a white pile; the clypeus and the inner orbits opposite the antennæ pale yellowish white. Mandibles pale yellowish white, their apices piceous; the palpi dark fuscous. Ocelli in a triangle; the hinder separated from the eyes by a distinctly greater distance than they are from each other. The thorax is covered with a white pile; the sides and base of the prothorax are narrowly pale testaceous. The median segment has a gradually rounded slope. Legs black; the four anterior coxæ are pale yellow beneath; the four anterior femora and tibiæ are more or less testaceous in front; the hinder femora are brownish towards the apex; the spurs are black. Wings hyaline, infuscated from the base of the stigma; the extreme apex is slightly paler in tint; the second and third cubital cellules are equal in length above and below; the first transverse cubital nervure is broadly

roundly curved, the second is slightly curved, the third is oblique; the first recurrent nervure is received shortly beyond, the second shortly behind, the middle of the cellule. The basal segment of the abdomen and the greater part of the second are rufo-testaceous; the other segments have the apices narrowly pale testaceous.

The apex of the clypeus is transverse in the middle, with the sides broadly rounded; the accessory nervure in the hind wings is interstitial.

In Bingham's arrangement (Faun. Brit. Ind., Hym p. 148) this species would come in near *acceptus*, Sm.

Anoplius styxus, sp. n.

Black; the lower two thirds of the inner and outer orbits, the apical half of the clypeus, a narrow interrupted line on the apex of the pronotum, the greater part of the frontal keel, and the basal fourth of the hinder femora on the outer side yellow; the wings hyaline, the apex smoky, the stigma and nervures fuscous. ♂.

Length 9 mm.

Hab. Assam.

Head smooth and shining, not developed behind the eyes, which distinctly converge above; a distinct furrow extends from the ocelli halfway down the front. There is a longish stout keel between the antennæ, which is yellow on the lower part. Apex of clypeus rounded. The flagellum of the antennæ yellow in the middle beneath. Thorax pruinose; the postscutellum, the base in the middle, and the sides of the median segment covered thickly with longish white pubescence. Legs black, the calcaria pale, the spines black. The second cubital cellule at the top is one third longer than the third; both the recurrent nervures are received shortly beyond the middle of the cellule.

The palpi are pale testaceous. Comes near to *P. maculipes*, Smith. Characteristic is the stout antennal keel.

Anoplius atargates, sp. n.

Black; the wings fuscous violaceous, with semihyaline patches; the third cubital cellule at the top more than half the length of the second, below not quite double its length. ♀.

Length 13 mm.

Hab. Khasia. Coll. Rothney.

Entirely black and covered with a silvery pile. Front indistinctly furrowed down the centre. Median segment

with a gradually rounded slope from the base to the apex; the base distinctly depressed in the middle. The apical abscissa of the radius is slightly roundly curved downwards towards the apex; the second cubital cellule at the top is one third longer than the third above and below; the first transverse cubital nervure is roundly curved, the top with a more oblique slope than the lower part; the third has a gradually rounded slope; the first recurrent nervure is received near the base of the apical third of the cellule, the second near the middle; the basal cellule in the fore wings is almost hyaline, the rest uniformly fuscous violaceous; the hinder wings are almost hyaline, darker towards the apex.

Comes near to *P. parenthope*, Cam., which may be separated from it thus:—

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| <p>The second and third cubital cellules below almost equal in length; above the second is distinctly more than double the length of the third; the wings dark fuscous violaceous throughout; the median segment furrowed in the middle; the long spur of the hinder tibiæ not reaching to the middle of the metatarsus.</p> | <p><i>parthenope</i>, Cam.</p> |
| <p>The second cubital cellule below one third shorter than the third, above not double its length; the wings not uniformly fuscous violaceous; the median segment not furrowed in the middle; the long spur of the hinder tibiæ reaching to the middle of the metatarsus</p> | <p><i>atargates</i>.</p> |

Vespidæ.

Rhynchium curvimaculatum, sp. n.

Black; the scape of the antennæ beneath, a mark over and between the antennæ, a curved almost interrupted mark on the top of the clypeus, an interrupted mark rounded behind on the pronotum, an irregular mark on the mesopleuræ below the tegulæ, a transverse mark on the base of the post-scutellum, the sides of the metanotum to the teeth and narrow bands, somewhat interrupted in the middle, on the apices of the basal two abdominal segments, yellow. Legs black, the apex of the four hinder femora broadly rufous. Wings fuscous violaceous. ♀.

Length 23 mm.

Hab. Khasia Hills. Coll. Rothney.

Front closely and strongly rugosely reticulated, the vertex more widely and irregularly punctured; in the centre behind is a curved, deep, smooth depression. Clypeus longitudinally rugosely punctured, the punctures longer than

broad and larger in its centre; the apex is depressed, irregularly punctured, and with a rounded incision in the middle. Mesonotum rugosely reticulated; the scutellum more strongly rugosely reticulated; the postscutellum coarsely longitudinally striated. Median segment reticulated above; the centre with curved striæ, the bottom alutaceous; the central keel is triangularly cleft and has a keel in the centre of the fork. Pro- and mesopleuræ rugosely reticulated; there is a longitudinal depression in the middle, which bears six perpendicular keels. The base and lower part of the metapleuræ smooth, the rest reticulated. The basal segments of the abdomen closely, but not very strongly, punctured; the third, fourth, and fifth are more strongly and deeply punctured than the basal; the apical sparsely punctured, smooth at the apex. The basal part of the petiole beneath is coarsely, irregularly, transversely striated; the apical smooth, bounded behind by a transverse furrow and covered with white pile.

This is the largest of the known Indian species.

Rhynchium collinum, sp. n.

Black; the scape of the antennæ below, a mark narrowed towards the middle above, over and between the antennæ, an interrupted line on the pronotum, the greater part of the basal half of the postscutellum, two marks on the sides of the median segment, the lower longer and narrower than the upper, a mark, longer and broader, in front of and below the tegulæ on the pleuræ, and a yellow line, interrupted in the middle, on the base of the basal two abdominal segments, yellow. Legs black, thickly covered with white pubescence; the extreme apex of the anterior femora, the apical third of the middle, and almost the apical portion of the hinder half of the posterior reddish; the apices of the tarsi rufous. Wings fuscous violaceous. ♀.

Length 17 mm.

Hab. Khasia Hills. Coll. Rothney.

Front and vertex coarsely punctured, the punctures almost forming reticulations in the centre; they are thickly covered with long fuscous hair. Antennal keel distinct, sharp. Face and clypeus rugosely reticulated and punctured; the apex of clypeus projects in the middle, smooth and depressed; the sides obliquely project. Pro- and mesonotum closely rugosely punctured, the punctures larger and running into reticulations on apex of mesonotum. The scutellum is more strongly rugosely punctured. The basal half of postscutellum rugosely punctured, the apical longitudinally striated. The apical half

of the median segment is irregularly reticulated and punctured, the rest transversely striated; in the middle of the area is a longitudinal stout keel. Pro- and mesopleuræ rugosely reticulated and punctured; the apical part of the metapleuræ irregularly reticulated; the upper part of the base smooth, the lower indistinctly and irregularly reticulated. The basal two abdominal segments are closely, almost uniformly, but not deeply punctured; the third and following are much more deeply punctured, the last more irregularly than the others.

The male has the clypeus entirely yellow; the apical incision is wide and shallow; the four front tibiæ are marked with yellow on the outer side, and the bands on the basal two segments of the abdomen are united, but this may be also the case with the female.

Apidæ.

Halictus carianus, sp. n.

Black, the pubescence white; the head and thorax closely and strongly punctured; the front with a narrow, not very distinct keel; the area on metanotum stoutly longitudinally striated; the wings fuscous violaceous, the nervures and stigma black. ♀.

Length 8 mm.

Hab. Khasia Hills. Coll. Rothney.

Head large, closely and strongly punctured, the punctures larger on the vertex than elsewhere; on the clypeus they are much sparser; the pubescence is sparse and white; the clypeus is fringed with long bright golden hair. The keel on the front is slender and is indistinct on the top. The pronotum projects distinctly above; its outer edge is raised into a sharp keel; the top inside this is flat and bears some irregular keels. The propleuræ above smooth and shining, the rest irregularly and somewhat strongly striated. The mesonotum is almost rugose. Mesopleuræ strongly rugosely punctured, the punctures running into reticulations in places. Postscutellar region strongly rugosely punctured. The area on the median segment is longitudinally striated; the punctures are stout and are clearly separated. The apical slope is keeled on the top and on the sides, and there is a narrower central keel which commences near the top; it is aciculated and indistinctly irregularly striated near the top. The hair on the coxæ, trochanters, and femora is long and white, on the tibiæ it is black, on the underside of the tarsi it is rufous; the spurs pale; the claws rufous. The wings are paler at the base; both the recurrent nervures are almost interstitial. The hair on the ventral surface of the abdomen

is white, on the back it is darker; the pygidial area is rufous.

Comes near to *H. timidus* and *H. guttersosus*. The male is similar; the apical half of the clypeus is pallid yellow; the flagellum of the antennæ is fuscous beneath. The furrow near the base of the mesopleuræ is wide and stoutly striated; the tubercles are fringed behind with white pubescence.

This species is easily known by the violaceous wings, by the strongly punctured head and thorax, and by the strongly keeled prothorax and median segment.

Helictus trincomalicus, sp. n.

Dark blue, with brassy tints, thickly covered with white pubescence; the base of the median segment irregularly longitudinally striated; the apices of the abdominal segments brownish; the anal rima dark brown; the wings hyaline, the stigma and nervures fuscous. ♀.

Length 6 mm.

Hab. Trincomali, Ceylon (*Col. Yerbury*).

Antennæ stout, black, the apical joint fuscous; the scape shining, covered sparsely with short pale hair. Head closely and distinctly punctured; the face brassy and more sparsely punctured than the rest; the base of the clypeus more sparsely and less strongly punctured than the apical half, which is dark purple. Mandibles ferruginous. Front indistinctly keeled. Pro- and mesothorax shining, punctured, but not strongly or closely, and thickly covered with white hair. Median segment closely and distinctly punctured; the striæ on the base are irregular, longitudinal in the middle, more oblique on the sides. Legs black; the calcaria testaceous; the pubescence white, on the metatarsus fulvous. Abdomen shining, impunctate; the apices of all the segments brownish; the anal rima dark brown; the apex of the anal segment in the centre and laterally lighter, more testaceous in colour; the apex bears fulvous hair.

Comes near to *H. vernalis*, Sm.

Mutilla acidalia, Cam.

This species was described by me in Proc. Manch. Soc. 1897, p. 56, in both sexes, from Trincomali, Ceylon, where they were taken by Col. Yerbury. The species has been overlooked by Bingham, who does not mention it in his work on Indian Hymenoptera. The species is probably, as André suggests (Ann. Soc. Ent. Fr. 1899, p. 34), a form of *M. ceylanensis*, Sichel & Rad., Horæ Soc. Ent. Ross. vi. p. 247, of which *M. hexapos*, Sauss. (also from Ceylon), is certainly a variety.

BIBLIOGRAPHICAL NOTICES.

An Account of the Indian Triaxonia collected by the Royal Indian Marine Survey Ship 'Investigator.' By FRANZ EILHARD SCHULZE, Ph.D., M.D., Professor of Zoology at the University of Berlin. The German original translated into English by ROBERT VON LENDENFELD, Ph.D., Professor of Zoology at the University of Prag. Calcutta: Printed by Order of the Trustees of the Indian Museum, 1902. Price 16 Rupees. 4to. Pp. 113; pls. xxiii.

THE work before us includes the substance of three separate papers published by Dr. Schulze in the 'Abhandlungen der Königl. Preussischen Akademie der Wissenschaften' for 1894, 1895, and 1900, on the Hexactinellida collected by the 'Investigator' in 1885-1898. These papers have been thoroughly revised by the author, and then translated into English.

Previous to the 'Challenger' expedition only four species of this beautiful group of sponges were known from the Indian Ocean. Upwards of fifty are now enumerated by Dr. Schulze, of which only twenty-one were known previous to the 'Investigator' expedition.

The group, however, is widely distributed in different parts of the world, and some of its representatives, such as the "Venus's flower-basket" from the Philippines (*Euplectella aspergillum*), and the glass-rope sponge from Japan (*Hyalonema Sieboldi*), may be seen in every museum. They are mostly deep-sea forms with skeletons frequently resembling spun glass or lacework, and are often of very elegant forms.

Dr. Schulze's work is too highly technical to appeal to any but specialists, except, perhaps, as regards the beautifully executed plates. He commences with an introduction, giving a list of the twenty-one species known before the 'Investigator' expedition; then follows the descriptive part of the work, in which two or three closely printed pages are usually devoted to each species; and the work concludes with three tables of the species known from the Indian Ocean, with full localities. The work is a valuable addition to the literature of one of the more modern branches of scientific exploration—deep-sea dredging.

Who's Who. London: Adam and Charles Black. 1903.

By this time nobody requires to be told the nature and aims of this most valuable book. As a work of reference it is indispensable. We take it for granted that there are few zoologists who do not possess it; our advice to those who do not is "get it."

A wise discrimination in the selection of individuals has most undoubtedly been exercised throughout the whole course of this work. We have searched the pages of the present volume diligently for the names of biologists, and have come to the conclusion that only a very few who deserve mention in these pages have been missed—their names may be reckoned on the fingers of one hand.

Handbook of Instructions for Collectors. London: The Trustees of the British Museum. 1902.

THIS little volume will undoubtedly prove a boon to collectors both at home and abroad.

In the space of some fourteen chapters the whole duties of a collector of natural-history specimens are set forth, so that in the compass of a small pocket-book he will find directions for the preservation, and often identification, of all kinds of specimens, from an elephant to microscopic organisms, fossils, plants, and minerals.

The capture and, where necessary, the killing of animals is also thoroughly dealt with. Furthermore, a complete list of the tools required, with many figures thereof, has also been included.

In a future edition, which is certain to be required, we should like to see special attention called to the need for the collection and preservation of birds' skeletons, and to the use of the alcoholometer not only as a test for spirit containing specimens, but also for the determination of the strength of clean spirit. It is not always possible to get reliable information as to the strength of spirit. With the help of the alcoholometer the collector can set all doubts at rest and save, perchance, most precious specimens.

This little work is well illustrated, well printed, and strongly bound.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

November 5th, 1902.—Prof. Charles Lapworth, LL.D., F.R.S.,
President, in the Chair.

The following communications were read:—

1. 'The Fossil Flora of the Cumberland Coalfield, and the Palæobotanical Evidence with regard to the Age of the Beds.' By E. A. Newell Arber, Esq., M.A., F.G.S.

The succession of Upper Carboniferous rocks in the region in question is apparently twofold: an essentially arenaceous series, at least 600 feet thick, consisting of massive sandstones alternating with shales and fireclays, overlying argillaceous and carbonaceous deposits; the latter forming the productive portion of the coalfield and containing three great coal-seams, traceable throughout the district, although known locally under different names. The Upper or Sandstone Series has yielded very few plant-remains from its upper division, but from the lower division a long list is given of plants collected by the Author, or preserved in the Woodwardian Museum. A second list of plants, from the upper division of the Carbonaceous Series, is also given, nearly all the specimens having been collected